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Harshavardhana et al.

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(54) **METHODS AND APPARATUS FOR ROUTING SIGNALS IN A RING NETWORK**

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(*) Notice: This patent issued on a continued prosecution application filed under 37 CFR 1.53(d), and is subject to the twenty year patent term provisions of 35 U.S.C. 154(a)(2).

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(58) **Field of Search** 370/222, 223, 370/224, 238, 254, 258, 400, 351, 452, 401, 402, 403, 404, 405

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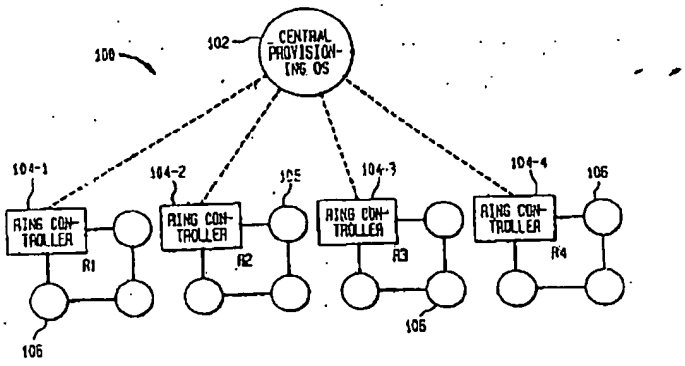
(57) **ABSTRACT**

Traffic demands are routed in a ring network by first determining an inter-ring path for a given demand, and then independently determining an intra-ring path for the demand on each of the rings in the inter-ring path. The intra-ring path provisioning is fully decoupled from the inter-ring path provisioning, such that the demand can be routed more quickly and efficiently. For example, both the routing direction and the interworking nodes for a dual ring interworking (DRI) connection can be determined independently for each of the rings of the inter-ring path. The invention may be implemented in the form of a hybrid centralized/distributed network architecture, in which a central operations system or other central controller determines the inter-ring path by applying a shortest path algorithm to a ring graph in which nodes represent rings in the network and links represent ring interconnections in the network. Ring controllers in the rings of the inter-ring path then each independently determine an intra-ring path for their corresponding rings. Although particularly well suited for use with DRI, the invention can also improve routing performance in single ring interworking (SRI) applications, as well as applications involving combinations of DRI and SRI.

18 Claims, 6 Drawing Sheets



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